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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,627	09/10/2003	Raffaele Correale	02-42 US	5606
23693	7590	02/23/2006	EXAMINER	
Varian Inc. Legal Department 3120 Hansen Way D-102 Palo Alto, CA 94304			SAYOC, EMMANUEL	
			ART UNIT	PAPER NUMBER
			3746	

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/659,627

Applicant(s)

CORREALE, RAFFAELE

Examiner

Emmanuel Sayoc

Art Unit

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 7-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1,7-11 and 13-15 is/are rejected.
- 7) ☒ Claim(s) 12 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2003 and 07 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendments of 12/07/2005. In making the below rejections and/or objections the examiner has considered and addressed each of the applicants arguments. Claims 1, and 7-16 are pending, and are under current consideration. Claims 1, 7-10, 13, and 16 are amended. Claims 2-6 and 17-20 have been cancelled.

Election/Restrictions

2. Applicant's election without traverse of invention group 1, claims 1, and 7-16 in the reply filed on 12/07/2005 is acknowledged.

Drawings

3. The objection to the drawings under 37 CFR 1.83(a) is hereby withdrawn in view of the replacement drawings filed 12/7/2005.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quenzer et al. (U.S. 6,168,395 B1), and in further view of Cabuz et al. (U.S. 6,351,054 B1).

In Figures 2, 10, and 11, Quenzer et al. teach a vibrating actuator assembly usable for valves and particularly as a pumping stage for micro vacuum pumps (see Abstract). Note that the pumps in Figure 10 and 11 use the valve actuator in Figure 2 as a pumping mechanism). The device comprises a supporting base (100), and a vibrating assembly (20, 20a,b,c,d) comprising a resilient planar membrane fastened to the supporting base (100). The vibrating assembly comprises an active surface (20a,b) by which the deflection of the molecules of surrounding gas (or any fluid) is caused during vibration of the vibrating assembly (20, 20a,b,c,d). A control device (electrodes 11, 12, 21, 22 – electrode controls motion of the membrane) is placed onto said supporting base (100), within a recess or cavity in the supporting base (100) to make the vibrating (20, 20a,b,c,d) assembly vibrate and consequently cause deflection of the gas molecules. The cavity houses the electrodes formed in the supporting base (100) below the vibrating assembly (20, 20a,b,c,d).

The Quenzer et al. device differs from the claimed invention in that there is no explicit teaching of the substrate comprising a silicon wafer.

The Quenzer et al., reference describes a device substantially made out of silicon material. The examiner takes official notice that it was well known to manufacture electronic chips out of silicon due to its ideal semiconductor properties. The substrate (100) is described as an active chip. The membrane (20) is fabricated out of silicon, and the substrate is formed using common silicon chip etching processes, see column 4 lines 41-53, column 5 lines 33-57. Furthermore the electrode (11, 12, 21, 22) attachment to the substrate (100) is describes as a silicon-silicon bond. It is evident, that the substrate chip (100) is also made of material comprising silicon, thus constituting a silicon wafer.

The control device (11, 12, 21, 22) is placed between the supporting base (100) and the vibrating assembly (20, 20a,b,c,d).

A variable electric field is applied between said electrode (11, 12, 21, 22) and the vibrating assembly (20, 20a,b,c,d) to cause vibration of said vibrating assembly (20, 20a,b,c,d) with respect to said supporting base (100).

The Quenzer et al., further device differs from the claimed invention in that there is no explicit teaching of the electric field generated by a sinusoidal signal and the sinusoidal signal has a frequency close to the resonance frequency of said vibrating assembly.

Cabuz et al. in Figure 8 describes an electrostatic actuator with a substrate (11), a diaphragm (13, 15) and electrodes (shown and tagged). An alternating current source (see abstract, column3 lines 23-65), which has a sinusoidal signal with a frequency, is connected to the electrodes thus producing a variable electric field and vibration of the

diaphragms (13, 15). A.C. power provides a natural alternating excitation of electrodes at its carrier frequency. Cabuz et al. teaches an AC voltage electrode driving device that allows for significant reduction in response time and power consumption. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Quenzer et al. device by, incorporating the AC power driving source and device as taught by Cabuz et al., in order to advantageously significantly reduce vibration member response time and power consumption. It was well known in the art that excitation of objects at its natural resonant frequency produces maximum response a minimum input. In column 3 lines 45-57, Cabuz et al. describe the modulation of the AC voltage magnitude and frequency to optimally fit the actuation application. With respect to the specific excitation frequency, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 CCPA (Patents) 1250, 156 F.2d 239, 70 USPQ 412; Minnesota Mining and Mfg. Co. v. Coe, 69 App. D.C. 217, 99 F.2d 986, 38 USPQ 213; Allen et al. v. Coe, 77 App. D.C. 324, 135 F.2d 11, 57 USPQ 136.

In Quenzer et al., the vibrating assembly (20, 20a,b,c,d) is a planar resilient membrane.

Quenzer et al., the vibrating assembly membrane (20, 20a,b,c,d) is substantially rectangular (see two rectangular membranes 20c,d encompassing surfaces 20a,b, Figure 2) and is fastened to the supporting base at its ends corresponding to the minor sides of the rectangle.

The Quenzer et al. membrane is (20, 20a,b,c,d) is also substantially H-shaped, with the central connection (covering passage 30) and is fastened to said supporting base at its four ends (100).

The Quenzer et al. membrane is (20, 20a,b,c,d) is fastened to the substrate (100) along a peripheral rim (see edges of the membrane sandwiched between chip 200 and 100), whereby the membrane is suspended above the cavity.

The Quenzer et al. substrate (100) is rectangular in shape and has a peripheral rim (outer portion of the rectangle). The vibration membrane (20, 20a,b,c,d) is fastened to the supporting base along the peripheral rim at edge regions of the membrane, which surrounds the cavity containing electrodes (11, 12, 21, 22), whereby a side extension (20b,c) partly overlaps the peripheral rim so as to define a corresponding first contact area (at least this area contact the chips 100 and 200). The electrodes (11, 12, 21, 22) comprise a side extension (2a, 2b) such that the electrode partly overlaps (with 2a, 2b) the peripheral rim of the supporting base (100) so as to define a corresponding second contact area (2a and 2b contact chips 100 and 200).

6. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quenzer et al., as applied to claim 1, and in further view of Eggleston (U.S. 862,867).

Quenzer et al. sets forth a device as described above, which is substantially analogous to the claimed invention. The Quenzer et al., device differs from the claimed invention in that there is no teaching of the vibrating assembly comprising a rigid

membrane supported by resilient members or suspension springs placed between the membrane and the supporting base, where the resilient members are fastened to the supporting base. Essentially what is claimed is a rigid piston with elastic peripheral edge vibrating assembly. Within the art of collapsible wall pumping devices, and in general conditions, the equivalence of planar diaphragm or membrane pumping elements and bellows pumping membranes was well known in the art. Eggleston in Figures 3 and 4 shows the general equivalence of a rigid piston with elastic peripheral edge vibrating assembly and a diaphragm in collapsible wall pumping devices, see column 1 line 29-35. First, the fact that the applicant claims a plurality of geometrical shaped embodiments of the vibration membrane is evidence that the particular shape and configuration of the vibration membrane is not the central and critical inventive concept of the claimed invention. Furthermore there has been no indication in the specification why the rigid piston with elastic peripheral edge vibrating assembly is critical over a planar vibration membrane. It is therefore evident that the plurality of vibration membrane configurations is functionally equivalent in the general nature of the pump invention. The Quenzer et al. device would certainly function substantially the same if a rigid piston with elastic peripheral edge vibrating assembly type vibration membrane were used. It would be straightforward to one of ordinary skill in the art to provide the necessary modifications to allow the bellows type membrane to function properly (including proper membrane clearances). Therefore since it has been established that bellows and planar membranes are functionally equivalent in the claimed invention and in the prior art, it would have been obvious to one of ordinary skill

in the art at time the invention was made to modify the Quenzer et al. device by, incorporating the rigid piston with elastic peripheral edge vibrating assembly, as taught by Eggleston, as a functionally equivalent design choice. In the combination, and as seen in Eggleston Figure 3, the bellows as a rigid membrane (L3) and a resilient membrane (L2). The resilient membrane (L2) is substantially s-shaped in cross section. Since the Quenzer et al. vibration membrane (20, 20a,b,c,d) and supporting base clearly have a thickness, and is generally planar in shape, it follows that the membrane and the supporting base are substantially of parallelepiped shape.

Allowable Subject Matter

7. Claims 12, and 16 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Amendment

8. The rejections of claims, 14 and 15, under 35 U.S.C. 112 2nd paragraph are hereby withdrawn in view of applicants amendments.

Response to Arguments

9. Applicant's arguments filed 12/07/2005 have been fully considered but they are not persuasive. First the applicant argues that the Quenzer, et al. membrane is "buckled" and has bistable buckled conditions. This may be but there is nothing in the

claims that precludes this property – only that the membrane be planar and resilient. As seen in Figure 2, the membrane is substantially planar and resilient.

Second the applicant asserts that Cabuz et al. teaches away from the use of sine wave actuation signals. This is not correct since in the Abstract and column 3 line 36 of the SUMMARY OF THE INVENTION, it is specifically stated that the preferred AC signals are selected from square-wave, sine wave, triangle wave and mixtures thereof.

Third the applicant argues that claim 13 does not claim a bellows as asserted by the examiner. The rejection has been reworded to denote a rigid piston with elastic peripheral edge vibrating assembly. Essentially what is claimed in claim 13 is shown in Eggleston Figure 3 and an equivalent of a diaphragm. The combination as stated above is maintained.

Finally the argument with respect to the attachment of the membrane to the support base at edge regions and on a peripheral rim is not persuasive because these areas are attached inclusively of other areas.

The applicant did not challenge the examiner's official notice that it was well known to manufacture electronic chips out of silicon due to its ideal semiconductor properties. Rejections on these grounds are made final.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are cited to further show the state of the art with respect to micro pumps.

U.S. Pat. 6,146,543 to Tai et al. – teach a bellows actuation membrane used for a micro actuator usable in a micropump.

U.S. Pat. 5,836,750 to Cabuz, 6,116,863 to Ahn et al., and 6,247,908 B1 to Shinohara et al. – teach pumps similar to the pumping concepts of the claimed invention.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

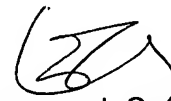
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Sayoc whose telephone number is (571) 272 4832. The examiner can normally be reached on M-F 8-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy S. Thorpe can be reached on (571) 272-4444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Emmanuel Sayoc
Examiner
Art Unit 3746

ECS



CHARLES G. FREAY
PRIMARY EXAMINER